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**AFPTEF REPORT NO. 09-R-02
AFPTEF PROJECT NO. 09-P-104**

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**First Article Testing of the
USMC Container Consolidation Pallet
Manufactured by Grate Pallet Solutions**

**403 SCMS/GUEB
AIR FORCE PACKAGING TECHNOLOGY & ENGINEERING FACILITY
WRIGHT PATTERSON AFB, OH 45433-5540
28 May 2009**

Report Documentation Page			Form Approved OMB No. 0704-0188		
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1. REPORT DATE 28 MAY 2009		2. REPORT TYPE		3. DATES COVERED	
4. TITLE AND SUBTITLE First Article Testing Of The USMC Container Consolidation Pallet Manufactured By Grate Pallet Solutions			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Packaging Technology & Engineering Facility,403 SCMS/GUEB,5215 Thurlow St., Ste 5,Wright-Patterson AFB,OH,45433			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited.					
13. SUPPLEMENTARY NOTES The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES 58	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

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AFPTEF PROJECT NO. 09-P-104

TITLE: First Article Testing of the USMC Container Consolidation Pallet

ABSTRACT

The United States Marine Corps (USMC) Blount Island Command (BIC) requested the AF Packaging Technology & Engineering Facility (AFPTEF) to develop a performance specification for two types of long-life consolidation containers for shipping and storage of USMC pre-positioning supplies: the Container Consolidation Pallet (CCP) and the Vehicle Consolidation Pallet (VCP). These were required to be compatible with pre-existing CCPs and VCPs, and the USMC prepositioning logistics system, especially the standard 8 ft. x 8 ft. x 20 ft. ISO shipping containers, warehouses and cargo holds.

AFPTEF participated in both the pre-proposal meeting and proposal evaluations following BICs Request for Proposals during the summer of 2006. The VCP portion of the contract was awarded to Grate Pallet Solutions LLC, while the CCP portion was awarded to another company. The original CCP contract has since been canceled and was offered to Grate Pallet Solutions (GPS), provided their CCP design could successfully meet first article requirements.

First article testing began with the delivery of two GPS first article CCPs to AFPTEF on 2 March 2009 and was completed 26 March 2009. Testing was performed in accordance with the CCP Test Plan which referenced the contract performance specification, ASTM D 4169 and MIL-STD-648. All tests were performed at AFPTEF except for the Loading/Unloading Test which will be conducted at BIC upon delivery of the first pallet shipment. The final CCP design successfully met all requirements of the performance specification.

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PUBLICATION DATE:

TABLE OF CONTENTS

ABSTRACT.....	i
TABLE OF CONTENTS.....	ii
INTRODUCTION	1
BACKGROUND	1
REQUIREMENTS.....	1
DEVELOPMENT	2
DESIGN	2
FIRST ARTICLES	3
QUALIFICATION TESTING.....	4
TEST LOADS.....	4
TEST PLAN.....	4
INSTRUMENTATION	5
TEST SEQUENCES	5
TEST CONCLUSIONS	11
CONCLUSIONS & RECOMMENDATIONS.....	12

APPENDICES

APPENDIX 1: Test Plan.....	13
APPENDIX 2: Container and Testing Photographs	22
APPENDIX 3: Contract Specification.....	38
APPENDIX 4: Distribution List	51
APPENDIX 5: Report Documentation	53

INTRODUCTION

BACKGROUND – The Container Consolidation Pallet (CCP) and the Vehicle Consolidation Pallet (VCP) have been used for several years by the United States Marine Corps (USMC) as reusable, long-life consolidation containers for shipping and storage of USMC Pre-Positioning supplies. These containers were previously purchased from multiple vendors as commercial off-the-shelf items, with varying degrees of success in meeting USMC requirements. At the request of the USMC Blount Island Command (BIC), the Air Force Packaging Technology & Engineering Facility (AFPTEF) developed a detailed performance specification for the two types to ensure that future containers would not only be compatible with pre-existing CCPs and VCPs, but would also meet all other requirements of the USMC Pre-Positioning logistics environment. The performance specification (Appendix 3) was based on both military and industry specifications for containers, materials and testing.

AFPTEF participated in both the pre-proposal meeting and proposal evaluations following BICs Request for Proposals (RFP) during the summer of 2006. The BIC contracting office determined that it was more cost effective to split the contract and awarded the VCP portion to Grate Pallet Solutions LLC, of Jacksonville, Florida and the CCP portion to a second contractor.

AFPTEF performed first article testing (FAT) on the original manufacturer's CCP design, which met all test requirements, in June 2007. However, due to delivery difficulties, the original CCP contract was canceled and offered to Grate Pallet Solutions (GPS) (the original back-up bidder) provided their CCP design could pass FAT.

Grate Pallet Solutions delivered two CCPs to AFPTEF on 2 March 2009 for FAT in accordance with the CCP Test Plan (Appendix 1) which referenced the contract performance specification. Testing was temporarily halted following rotational drop testing to permit minor shelf re-design. GPS returned with the improved shelving 2 weeks later; all tests involving the shelves were successfully repeated and all remaining tests were successfully performed. All tests were performed at AFPTEF, except for the Loading/Unloading Test which will be conducted at BIC upon delivery of the first containers. The final CCP design successfully met all requirements of the performance specification.

REQUIREMENTS – AFPTEF and BIC personnel agreed upon a list of CCP requirements during initial specification development. The primary requirements were:

- Reusable and designed for long life (100 trips minimum) in a worldwide service environment
- 1,000 pounds tare weight, and 4,000 pounds maximum gross weight.
- Compatible with existing CCPs and tarp covers
- Compatible with standard 8 ft. x 8 ft. x 20 ft. ISO shipping containers, warehouses and cargo holds
- Transportable by forklift, cargo net, truck, ship and rail

- An open structure to permit easy viewing of contents while preventing pilferage and debris entrapment
- Permit easy access to contents when stacked
- Low maintenance and high corrosion resistance
- Ergonomic design, with lightweight components permitting easy assembly by only two workers

DEVELOPMENT

DESIGN – The Grate Pallet CCP final design (Appendix 2, Figure 1) consists of a pallet base with two end panels, six side panels, one top panel, two center support posts, and three center dividers, and met all BIC requirements as stated in the contract detailed specification. The CCP is compatible with all previously purchased containers permitting both stackability and the ability to use new and old tarp coverings with all CCPs interchangeably (these capabilities will be demonstrated at and by BIC upon delivery of containers; however, since GPS is manufacturing the tarps and many of BIC's existing CCPs were made by GSP, full compatibility is extremely likely). It is an open structure that minimizes debris entrapment while maintaining strength. All openings are too small to permit easy access to the contents, but still permit easy viewing of contents. Sliding tabs on the top and side panels may be secured using locks, or other tamper-evident devices, to provide added security for contents (Appendix 2, Figure 2). Removable components meet the ergonomic weight requirements of MIL-STD-1472 and the pallets are easily assembled and disassembled by only two workers.

All pallet components are made of galvanized steel and consist of a grated forkliftable base with short rigid end panels, to which are attached removable and collapsible upper end panels. Panels consist of steel frames with a wire mesh welded to the frames. Each of the six long side panels hook into the end posts. The single top panel hooks into the four end posts; the center (shelf) support posts insert into the base C-channel at the bottom and have interlocking tabs with the top panel frame. Each center divider may be hooked into the center support posts in order to create two separate storage areas, independently of any other divider or shelves used. Ergonomic considerations (during assembly) limited component weights to no more than 37 pounds for pallet sides, shelves, center divider, and top panels. The end panels are limited to no more than 44 pounds.

A total of four shelves can be installed in each CCP, each mounted independently of any other shelf. Shelf height is adjustable every two inches. Center and end posts have height-corresponding permanent markings by using 3 corresponding and repeating shapes to facilitate level shelf installation (Appendix 2, Figure 3). Shelves supplied with the original design had straight (unhooked) center post insert tabs, however, initial dynamic testing proved this design to be inadequate. GPS returned to AFPTEF on 23 March 2009 with 4 re-designed, slightly sturdier shelves (with a weight increase of 2 lb over the original shelf), with hooked center post insert tabs to increase their ability to remain in place. Shelf insert tabs for connection to end panel posts use a small sliding "latch" to insure they remain in place (Appendix 2, Figure 4).

Pallet tare weight, with all components (one base, two end panels, 6 side panels, one top panel, 2 center support posts, 4 shelves and 3 center dividers), was limited to 1000 pounds, with an intended fully loaded gross weight of 4000 pounds. Final tare weight as designed was 858.5 lb.

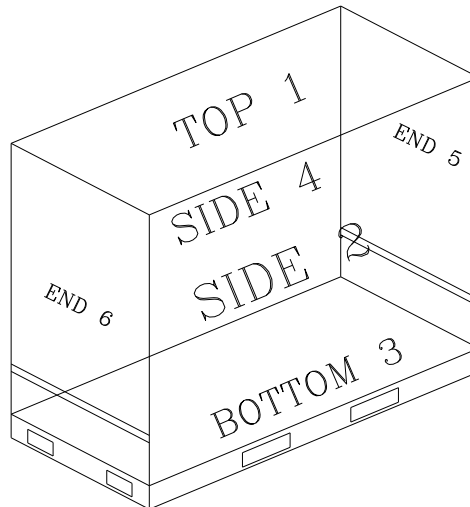
The post bottoms of the upper end panels nest into the posts of the rigid end panels and are held in the upright position by locking pins. Indexing tabs on top of the four corner posts permit easy pallet stacking (Appendix 2, Figure 5), and stowable pins are used to lock stacked pallets together.

CCP CONTAINER FEATURES	
Forkliftable	Yes
End Panels	2
Side Panels	6
Top Panel	1
Shelves	4
Center Divider	3
Center Divider Support Post	2
Top panel sliding lockable tabs	2 each
Side panel sliding lockable tabs	1 each
Internal Corner Tie-down Points	4
Stowable Pins for Stack Locking	4
Stacking Capability	Yes

FIRST ARTICLES – Two complete first article pallets were furnished by Grate Pallet for use in testing. Each consisted of a pallet base with two end panels, six side panels, one top panel, two center support posts, four shelves and three center dividers. Each pallet weighed 858.5 pounds.

Each face of the tested CCP was identified for testing identification as shown below.

DESIGNATED SIDE	CONTAINER FEATURE
1	Top
2	One Long Side
3	Bottom
4	Opposite Side 2
5	End
6	Opposite End 5



QUALIFICATION TESTING

TEST LOADS

Component Test Loads (Test Sequences 7 – 9) – Iron weights placed in wood boxes or on boards with footprints of either 12 in. x 12 in. or 36 in. x 36 in., as described in the test sequences below.

Dynamic Test Load (Test Sequences 10 – 20) – Pallet base: Iron weights secured in a wood box with a footprint of 36 in x 36 in, weighing 2000 lb. Pallet shelves: Iron weights secured in a wood box with a footprint of 12 in. x 12 in., weighing 250 lb each, for a total of four (one per shelf).

TEST PLAN – The test plan (Appendix 1) primary references were the contract performance specification (Appendix 3), ASTM D 4169 and MIL-STD-648. The methods specified in the test plan constituted the procedure for performing the container testing.

Pass/Fail Criteria for Quality Conformance Tests (Sequences 1 – 6): The CCP shall meet all size, weight, assembly and usability requirements in the performance specification.

Pass/Fail Criteria for Component and Performance Tests (Sequences 7 –22): There shall be no damage or deformation of the components or assembled pallets that would interfere with assembly, permit spillage or damage to articles, reduce pallet strength or cause stacking instability, or adversely affect safety, transportability or storage, interfere with forklifting or otherwise affect pallet functionality. All components shall remain in place throughout testing. The CCP must meet all additional requirements of the contract performance specification.

These tests are commonly applied to shipping containers used throughout DOD. The tests were performed at AFPTEF, 403 SCMS/GUEB, 5215 Thurlow St, Wright-Patterson AFB, Ohio.

INSTRUMENTATION – Neither the container nor the test load were instrumented for testing.

TEST SEQUENCES – Note: All test sequences were performed at ambient temperatures and humidity. The tested CCP, except as noted in test sequences below, consisted of one base, two end panels, 6 side panels, one top panel, 2 center support posts, 4 shelves, and 3 center dividers.

TEST SEQUENCE 1 – Examination of Product

Procedure: One CCP shall be examined for the required number of components: 1 base, 2 end panels, 6 side panels, 1 top panel, 2 center posts, 4 shelves, 3 center dividers; and the outer maximum dimensions: 90 in. x 46 in. x 80 in. Other areas of conformity to examine are base dimensional features, anti-pilferage provisions, self-storage of associated parts, collapsibility and storability, the presence of internal tiedowns, and workmanship for absence of sharp protrusions, welds, uniformity of galvanization and openness of components (to prevent debris entrapment).

Results: All required components were present. The assembled CCP dimensions were 89.5 in. x 45.9 in. x 79.0 in. (including the 1.5 in. high stacking interface tabs located at each corner) (Appendix 2, Figures 1 & 5). The CCP collapsed height (at corner posts) was 17.25 in. There were no openings or gaps between components or panels greater than 2.5 inches.

All workmanship requirements were met. All components met BIC requirements for openness and ease of cleaning. All required label and marking plates met specification requirements. The CCP met all requirements.

TEST SEQUENCE 2 – Weight Test

Procedure: One CCP, and one each of the individual components, shall be weighed for conformance to ergonomic requirements. Maximum weights are: fully assembled: 1000 lb; each side panel, shelf, and center divider: 37 lb; top panel: 74 lb; end panel: 88 lb.

Results: The final fully assembled CCP weighed 858.5 lb \pm 2 lb. The top panel weighed 44.0 lb \pm 1 lb; each side panel weighed 36.0 lb \pm 1 lb; the center divider weighed 12.0 lb \pm 1 lb; each end panel weighed approximately 82.0 lb \pm 1 lb. The original shelf weight was 28.5.0 lb \pm 1 lb; the re-designed (final) shelf weight was 30.5 lb \pm 1 lb. Neither the fully assembled pallet nor any individual CCP component exceeded its maximum allowable weight.

TEST SEQUENCE 3 – Assembly

Procedure: One pallet shall be assembled and disassembled by 2 AFPTEF workers, 2 times. No tool use is permitted during assembly. Each assembly shall take no more than 5 minutes.

Results: The assembly times were 5 minutes for each assembly, and no tools were needed. Assembly requirements were met.

TEST SEQUENCE 4 – Interchangeability of components

Procedure: A second CCP shall be disassembled and the components of this and the CCP used in the Weight and Assembly tests intermixed. Test Sequence 3 shall be repeated and observed for any difficulties in the use of intermixed parts. There shall be no change in ease of assembly or fit of components.

Results: There was no difference in ease of assembly. All components fit together as easily as in Test Sequence 3. Interchangeability requirements were met.

TEST SEQUENCE 5 – Collapsibility (To be performed at BIC, by BIC personnel)

Procedure: One collapsed CCP, with all components, shall be measured for conformance to requirements. Five stacks of five collapsed, banded or unbanded, CCPs shall fit into (be forkliftable into) a standard 8 ft. x 8 ft. x 20 ft. ISO container as for shipment. The stacks shall then be removed. Stacks shall be easily forkliftable into and out of a standard ISO container without interference or difficulty in handling. Five identical stacks (for a total of 25 collapsed pallets) shall fit inside a closed standard ISO container.

Results: One collapsed CCP measured 90 in. x 46 in. x 17.25 in. The exposed nested height when stacked was 16.25 in.; therefore, the stack height for 5 collapsed pallets is approximately 82.25 inches. By analysis, all 5 stacks of 5 collapsed pallets will fit into a closed ISO container. The CCP therefore appears to meet collapsibility requirements; however, this shall be verified with actual CCPs by BIC upon delivery of the first shipment of containers. (See Appendix 2, Figures 6 & 7)

TEST SEQUENCE 6 – Loading/Unloading (To be performed at BIC, by BIC personnel)

Procedure: Five assembled CCPs (loaded) shall fit into (be forkliftable into) a standard 8 ft. x 8 ft. x 20 ft. ISO container as for shipment. All CCPs shall then be removed. CCPs shall be easily forkliftable into and out of a standard ISO container without interference or difficulty in handling. Five identical CCPs shall fit inside a closed standard ISO container.

Results: The assembled CCP dimensions of 89.5 in. x 45.9 in. x 79.0 in. (including the 1.5 in. high stacking interface tabs located at each corner) should permit easy forklifting of the CCPs into and out of a standard ISO container. This will be verified by testing by BIC personnel upon delivery of the first shipment of containers.

TEST SEQUENCE 7 – Component Testing, Pallet Base

Procedure: One CCP base shall be supported at each end by a wood 4x4. A 36 in. x 36 in., 3000 lb, load shall be centered on the base and left in place for 24 hours.

Results: At the end of the 24 hour period, the test load was removed and the base examined. There was no permanent deformation or damage to the pallet base that

exceeded the pass/fail criteria (above). The CCP base met test requirements. (See Appendix 2, Figure 8)

TEST SEQUENCE 8 – Component Testing: Shelves, Side and Top Panels, and Center Divider

Procedure: One of each component shall be supported by a wood 4x4 placed at each short end. A 12 in. x 12 in., 250 lb load, shall be centered on one each shelf and center divider and left in place for 24 hours. A 12 in. x 12 in., 500 lb load, shall be centered on one each top and side panel and left in place for 24 hours.

Results: At the end of the 24 hour period, the test loads were removed and each component examined. There was no permanent deformation or damage to any component (including both original and re-designed shelves) that exceeded the pass/fail criteria (above). The CCP components met test requirements. (See Appendix 2, Figures 9 - 12)

TEST SEQUENCE 9 – Component Testing, End Panels

Procedure: One end panel shall be supported by a wood 4x4 placed at each short end. A 36 in. x 36 in., 1500 lb load, shall be centered on the panel and left in place for 24 hours.

Results: At the end of the 24 hour period, the test load was removed and each component examined. There was no permanent deformation or damage to the end panel that exceeded the pass/fail criteria (above). The CCP components met test requirements. (See Appendix 2, Figure 13)

TEST SEQUENCE 10 – Rotational Corner & Edge Drops

Procedure: The 2000 lb dynamic test load (described above) shall be centered on a CCP pallet base. One cargo strap shall be securely wrapped around the load's horizontal girth. A second cargo strap shall be threaded through the girthwise strap on the side facing End 6, and each end of the strap shall be hooked into the two tie-down locations on End 6 and ratcheted snugly, but not to full tightness. A third cargo strap shall be threaded through the girthwise strap on the side facing End 5, and each end of this strap shall be hooked into the two tie-down locations on End 5, and ratcheted snugly, but not to full tightness. (This method of securing the load ensures that upon each test impact the load shall be supported and held in place by only two tie-down locations.) One 250 lb dynamic test load (total of four described above) shall be centered on each shelf and secured in place by 2 crossed cargo straps, each of which shall be hooked into the mesh of the shelf. A total of 8 inflated air bladders, measuring 30 in. x 30 in. before inflation, shall be wedged between the end panel and each shelf load, and the center divider and each shelf load, (2 per shelf, 4 per shelf level) to prevent each box from shifting out of place during testing (Appendix 2, Figure 14). The loaded CCP (gross weight 3851 lb) shall be placed on a steel plate in preparation for drop testing. CCP ends and sides (opposite to those being tested) shall be placed on a 6-inch high block which supports the total length of the edge for edgewise drops. CCP corners (opposite to those being tested) shall be placed on a 12-inch high block

supporting one corner (and a 6-inch block under the adjacent corner) for cornerwise drops. A chain sling shall be hooked into the external hoisting provisions at the opposite pallet end and used to lift the pallet to the prescribed drop height of 12 inches by means of a quick-release mechanism attached to a hoist. The pallet shall then be released and allowed to freely impact the edge or corner onto the 1-inch thick steel plate. Each corner and each end edge shall be impacted one time.

Report: During the first three rotational drops (on edge 5-3, and corners 5-3-2 and 5-3-4), the shelves bent downward under the load approximately 1.5 inches, but stayed inserted into the corner and center posts. The fourth drop was performed on edge 6-3, whereupon the bottom end 5 shelf slipped out of the center post and the inner edge landed on the base test load. Testing was halted due to performance failure.

GPS delivered 4 re-designed shelves (shelf design and weight as described above) to AFPTEF on 23 March 2009. The original shelves were replaced with the re-designed shelves, and all shelves reloaded as described above. Previous drops were repeated and the final two drops (onto corners 2-3-6 and 4-3-6) performed. The pallet was inspected for damage or weakening of the shelves and overall structure after each impact. The re-designed shelves bowed downward approximately 0.5 inches after testing, however, there was no permanent deformation or damage to the CCP that exceeded the pass/fail criteria (above). The CCP met test requirements (see Test Conclusions for additional information, page 11). (See Appendix 2, Figures 15 & 16)

TEST SEQUENCE 11 – Shipboard Shock Test

Procedure – A CCP with the test loads secured as in Test Sequence 10 shall be lifted using 2 chain slings (4 hooks total) hooked into the CCP's four hoisting provisions and a quick-release hook to a height of 18 inches. All four top edges of the CCP shall be checked with a level to ensure that the CCP, on release, lands on all four edges and corners simultaneously. The CCP shall be released and allowed to impact once onto a steel plate.

Report: The pallet was inspected for damage or weakening of the overall structure after impact. There was no permanent deformation or damage to the CCP that exceeded the pass/fail criteria (above). The CCP met test requirements. (See Appendix 2, Figure 17)

TEST SEQUENCE 12 – Stacking Interface

Procedure: One fully assembled CCP (loaded or unloaded) shall be placed on a loaded CCP using their indexing and locking features. The ease of use of the locking features, general stability of the stacked CCPs, and the ability to remove one or more side panels while CCPs are stacked, shall be verified.

Results: The indexing features permitted easy stacking of the CCPs. The stowable locking pins were simple and easily used to lock the stacked CCPs

together. The stack of two CCPs remained stable while side panels were removed and replaced. The CCPs met all stacking interface requirements. (See Appendix 2, Figure 18)

TEST SEQUENCE 13 – Tipover Test

Procedure: A CCP with the test loads secured as in Test Sequence 10 shall be lifted along one long side to a 22 degree angle from the vertical. The pallet shall be released and allowed to fall freely. The pallet shall right itself and not tip over.

Results: Upon release, the pallet righted itself and showed no tendency to tip over. The pallet was inspected for damage or weakening of the overall structure after testing. There was no permanent deformation or damage to the CCP that exceeded the pass/fail criteria (above). There was no instability that would adversely affect safety or transportability. (See Appendix 2, Figure 19)

TEST SEQUENCE 14 – Forklift Truck Handling Test, Transportability

Procedure: Three pairs of 1 in. x 6 in. boards shall be laid out on a 100-ft test course at intervals of 30, 60, and 90 feet. The board angles to the forklift truck's path shall be 90, 60, and 75 degrees respectively, with the left wheel striking first over the second board pair, and the right wheel first over the third pair. The test course shall be run with a single CCP, and repeated with a stack of two CCPs locked together. The load shall be placed in the bottom CCP and secured as in Test Sequence 10. The course shall be run two times for each configuration.

Results: The pallets were inspected for damage or weakening of the overall structure after testing. There was no permanent deformation or damage to the CCPs that exceeded the pass/fail criteria (above). There was no instability that would adversely affect safety or transportability. (See Appendix 2, Figures 20 & 21)

TEST SEQUENCE 15 – Forklift Truck Handling Test, Pushing

Procedure: A stack of two CCPs, as used in Test Sequence 14, shall be placed on a hard, dry pavement with the forklift tines abutting the end of the bottom pallet near the floor, with the mast in the vertical position. The stack of pallets shall then be pushed a distance of 35 feet in approximately 85 seconds at a uniform speed. The test shall be repeated, pushing against the long side.

Results: The pallets were inspected for damage or weakening of the overall structure after testing. There was no permanent deformation or damage to the CCPs that exceeded the pass/fail criteria (above). There was no instability that would adversely affect safety or transportability. (See Appendix 2, Figure 22)

TEST SEQUENCE 16 – Forklift Truck Handling Test, Lifted Push

Procedure: The procedure of Test Sequence 14 shall be repeated on one short end only, except that the opposite end shall be lifted 6 inches off the ground by the tips of the forks.

Results: The pallets were inspected for damage or weakening of the overall structure after testing. There was no permanent deformation or damage to the CCPs that exceeded the pass/fail criteria (above). There was no instability that would adversely affect safety or transportability. (See Appendix 2, Figure 23)

TEST SEQUENCE 17 – Impact Test

Procedure: A CCP with the test loads secured as in Test Sequence 10 shall be placed on the pendulum test apparatus and impacted once on each side and end, with an impact velocity of 7 ft/s.

Results: The CCP was removed from the test apparatus and examined. All internal tiedowns were undamaged. There was no deformation or damage that exceeded the pass/fail criteria (above). The CCP met test requirements. (See Appendix 2, Figure 24)

TEST SEQUENCE 18 – Single Hoisting Fittings Strength Test

Procedure: Each CCP hoisting provision shall be used to lift a CCP (with the test loads secured as in Test Sequence 10) into the air and keep it suspended for a period of 5 minutes (a total of four lifts).

Results: After the final hoisting, each hoisting provision and the entire CCP was carefully examined for damage. There was no deformation or damage that exceeded the pass/fail criteria (above). The CCP met test requirements. (See Appendix 2, Figure 25)

TEST SEQUENCE 19 – Vibration Test

Procedure: A sheet of 3/4-inch plywood was bolted to the top of the vibration table. The CCP with the load secured as in Test Sequence 10 shall be centered on the plywood covered table. Restraints shall be used to prevent the CCP from sliding off the table, while permitting approximately 1/2-inch unrestricted movement in the horizontal direction from the centered position on the table.

The table frequency shall be increased from 3.5 Hertz (Hz), one-inch double amplitude, until the pallet leaves the table surface and a 1/16-inch-thick flat metal feeler can be slid freely between the table top and the CCP (approximately 4.4 Hz). Repetitive shock testing shall be conducted for 2 hours at ambient temperature.

Results: The above test method was replaced by a “real-life” random vibration testing (based on ASTM D4169, DC-18, A1.7 (Random Vibration)), which is typically considered a more rigorous vibration test. One loaded pallet was transported by forklift over surface roads and gravel lots for a total of 40 minutes. The forklift operator made every effort to drive over surface irregularities (pot holes, cracks, bumps, drains and sloping shoulders). Forklift tines were in the “back” position, but no other effort was made to restrict the pallet’s movement on the tines. Observation of the pallet’s movement on the forklift indicated that this test was clearly more severe than the originally planned test method.

Examination following the test indicated that there was no weakening of or damage to the CCP that would adversely affect safety or transportability. The CCP met test requirements. (See Appendix 2, Figure 26)

TEST SEQUENCE 20 – Sling Handling (both single- and double-sling procedures modified to use a cargo net instead of slings)

Procedure: The CCP with the load secured as in Test Sequence 10 shall be placed in the center of a 12 ft. x 12 ft. cargo net, rated for 4500 lb (supplied by BIC). The cargo net shall then be lifted by its four corner rings, centered at an apex hook, until the CCP clears the ground and allowed to hang in place for 5 minutes. The CCP shall be lowered to the ground, removed from the cargo net and examined.

Results: The pallet was inspected for damage or weakening of the overall structure. There was no permanent deformation or damage to the CCP that exceeded the pass/fail criteria (above). There was no instability that would adversely affect safety or transportability. (See Appendix 2, Figure 27)

TEST SEQUENCE 21 – Hoisting Fittings Strength Test

Procedure: One CCP, with shelves, bottom and middle side panels, center dividers, and top panels removed, shall be loaded with 10,000 pounds. It shall then be lifted by means of chains hooked into the four hoisting provisions until it clears the floor. The loaded CCP shall hang for 5 minutes and then lowered to the floor.

Results: All weights were removed, and each hoist fitting and overall CCP structure were inspected for damage or weakening. There was no deformation, damage or observable weakening that exceeded the pass/fail criteria (above). (See Appendix 2, Figure 28)

TEST SEQUENCE 22 – Superimposed Load

Procedure: One CCP base shall be used to create a flat surface with a footprint identical to a CCP stacking footprint. This CCP base shall be placed on top of one fully assembled CCP, and the locking pins put in place. A test weight of 8,000 lb shall be stacked on top of this base and left in place for 24 hours.

Results: At the end of the 24 hour period, the superimposed load was removed and the assembled pallet examined. There was no permanent deformation or damage that exceeded the pass/fail criteria (above). The CCP met test requirements. (See Appendix 2, Figure 29)

TEST CONCLUSIONS – The tested CCP, with the final shelf design, met all of the size, weight, assembly, and usability requirements in the performance specification. There was no damage or deformation of the components or assembled pallets during testing that would interfere with assembly, permit spillage or damage to articles, reduce pallet strength or cause stacking instability, adversely affect safety, transportability or storage, interfere with forklifting or otherwise affect pallet functionality.

Throughout dynamic testing, the insert tabs of the top center divider were pushed out of their insertion points by the pressure of the inflated air bladders. This caused the center divider to fall and rest on top of the middle center divider. Since the movement was minimal and the load remained in place, this was not considered a failure. All other components remained fully in place throughout dynamic testing. The CCP therefore met all requirements.

CONCLUSIONS & RECOMMENDATIONS

As stated above, the Grate Pallet CCP met BICs size, weight, assembly and usability requirements as stated in the performance specification. AFPTEF therefore recommends that the USMC Blount Island Command Contracting Office proceed with full contract award. It is also strongly recommended that BIC shall immediately perform physical testing to verify analytical results of Test Sequences 5 & 6 upon delivery of the first CCPs.

APPENDIX 1: Test Plan

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR:		WEIGHT (LB) GROSS: TARE		CUBE (CU. FT)	QUANTITY:	DATE:
90 X 46 X 80		4000 858.5		200	2	2 Mar 09
ITEM NAME: Prepositioning supplies				MANUFACTURER: Grate Pallet		
CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS		CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT	
<p align="center"><u>QUALITY CONFORMANCE TESTS</u></p> <p>Pass/Fail Criteria: There shall be no permanent deformation or damage of the components that would interfere with their assembly or use with the pallet; permit spillage of, or damage to, articles; or adversely affect safety during transportation or storage</p>						
1.	<u>Examination of Product</u>	<p>Contract Specification (C.S.) Para. 2.1, 2.1.1, 1.1.3, 1.2, 1.3, 1.6, 1.7.1</p> <p>CCP shall be carefully examined to determine conformance with material, workmanship and the general design requirements. The complete CCP shall consist of 1 base, 2 end panels, 6 side panels, 1 top panel, 4 shelves and 3 center dividers.</p> <p>Max dimensions NTE <u>90 in. x 46 in. x 80 in.</u></p>		Ambient temp.	Visual Inspection (VI), tape measure.	
2.	<u>Weight Test.</u>	<p>C.S. Para. 2.1.2.1, 2.1.2.2 1.7.1.2, 1.4.2</p> <p>One complete CCP, and each component, shall be weighed. Maximum tare weight <u>1000 lb.</u> Sides, shelves & center dividers \leq <u>37 lb</u>; end walls \leq <u>88 lb</u>; top panel \leq <u>74 lb</u>.</p>		Ambient temp.	Scale	
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer				APPROVED BY: Robbin L. Miller, Chief AFPTEF		

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR:		WEIGHT (LB) GROSS:		CUBE (CU. FT)	QUANTITY:	DATE:
EXTERIOR: 90 X 46 X 80		TARE: 4000 858.5		200	2	2 Mar 09
ITEM NAME: Prepositioning supplies				MANUFACTURER: Grate Pallet		
CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS			CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT
3.	<u>Assembly.</u> C.S. Para. 2.1.3, 1.4.1	One pallet shall be assembled and disassembled by 2 workers a minimum of 2 times. Each assembly shall take no more than 5 minutes. No tools shall be required for assembly.			Ambient temp.	
4.	<u>Interchangeability of Components.</u> C.S. Para. 2.1.3.1, 1.3.4	Components of 2 pallets minimum shall be intermixed at random and one complete pallet assembled from the intermixed parts. There shall be no difference in assembly from Test No. 3 above.			Ambient temp.	
5.	<u>Collapsibility.</u> (To be performed by BIC personnel upon delivery of first containers.) C.S. Para. 2.1.3.2, 1.3.7, 1.7.2.9	One collapsed pallet shall be measured for conformance to referenced paragraphs. Ends shall remain attached to base frame. A stack of 5 collapsed CCPs shall fit in 8' x 8' x 20' ISO container. 5 stacks of 5 collapsed CCPs shall fit in the closed ISO container.			Ambient temp.	
6.	<u>Loading/Unloading.</u> (To be performed by BIC at Blount Island.) C.S. Para. 2.1.4	5 assembled CCPs shall be loaded with typical loads, and loaded into an ISO container as for shipment. 5 assembled CCPs shall fit into a closed ISO container.			Ambient temp.	
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer				APPROVED BY: Robbin L. Miller, Chief AFPTEF		

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR:		WEIGHT (LB) GROSS:		CUBE (CU. FT)	QUANTITY:	DATE:
EXTERIOR: 90 X 46 X 80		TARE: 4000 858.5		200	2	2 Mar 09
ITEM NAME: Prepositioning supplies				MANUFACTURER: Grate Pallet		
CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS		CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT	
<p align="center"><u>COMPONENT TESTING</u></p> <p>Pass/Fail Criteria: Upon completion of each test, there shall be no permanent deformation or damage of the components that would interfere with their assembly or use with the pallet; permit spillage of, or damage to, articles; or adversely affect safety during transportation or storage.</p>						
7.	<u>Pallet base.</u> C.S. Para. 2.3.1	Base shall be supported at each end, off the ground. A 3000 lb load w/ 36" x 36" footprint shall be centered on the base for 24 hours.		Ambient temp.	Supports, iron weights, footprint board or box.	
8.	<u>Shelves, side and top panels, and center dividers.</u> C.S. Para. 2.3.2, 2.3.4	A centered load, with footprint dimensions and weight described below, shall be placed on one each of the following components: Shelf : 12 in. x 12 in. / 250 lb Center Div.: 12 in. x 12 in. / 250 lb Top Panel (full length): 12 in. x 12 in./500 lb Side Panel: 12 in. x 12 in. / 500 lb Components shall be supported at each end, off the ground.		Ambient temp.	Supports, iron weights, footprint board or box.	
9.	<u>End panels.</u> C.S. Para. 2.3.3	One end panel shall be supported at each end, off the ground. A centered 1500 lb load, with a 36 in. x 36 in. footprint, shall be placed on the panel for 24 hours.		Ambient temp.	Supports, iron weights, footprint board or box.	
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer				APPROVED BY: Robbin L. Miller, Chief AFPTEF		

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR:		WEIGHT (LB) GROSS:		CUBE (CU. FT)	QUANTITY:	DATE:
EXTERIOR: 90 X 46 X 80		TARE: 4000 858.5		200	2	2 Mar 09
ITEM NAME: Prepositioning supplies				MANUFACTURER: Grate Pallet		
CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS			CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT
<p><u>PERFORMANCE TESTS</u></p> <p>Test Load for all tests: A centered 2000 lb test load with a footprint of 36 in. x 36 in., restrained using 2 (effective) internal tiedowns shall be placed on the pallet base. One centered 250 lb test load with a footprint of 12 in. x 12 in., and restrained with 2 cargo straps and inflatable dunnage bags, shall be placed on each shelf (total of 4). Loads shall be returned to original location if they shift more than 4 inches during testing. All ASTM test methods shall be performed to Assurance Level I.</p> <p>Pass/Fail Criteria: There shall be no damage, deformation or degradation of the pallet that would permit spillage of loose articles or packages, prevent installation of components, reduce pallet strength or cause stacking instability, or adversely affect safety during transport or storage, or interfere with forklifting or pallet fit in an ISO container. All components shall remain in place. Hoist fittings shall be capable of supporting the load described in Test Sequence 20. CCPs shall meet additional criteria stated below.</p>						
10.	<u>Rotational Corner & Edge Drops.</u> C.S. Para. 2.4.4; ASTM D4169, DC 18, A1.2.2.2(3) (D6179 Methods A & B)	Drops shall be performed on all corners and each short edge, using a 12" drop height.			Ambient temp.	Support blocks, hoist, chains, quick-release.
11.	<u>Shipboard Shock Test.</u> C.S. Para. 2.4.5; MIL-STD 648, 5.2.9.1	The pallet shall undergo an 18 inch free-fall flat drop test, onto a rigid surface.			Ambient temp.	Quick release, hoist, chains.
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer				APPROVED BY: Robbin L. Miller, Chief AFPTEF		

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR: EXTERIOR:		WEIGHT (LB) GROSS: TARE:		CUBE (CU. FT)	QUANTITY:	DATE:
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ITEM NAME: Prepositioning supplies				MANUFACTURER: Grate Pallet		
CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS			CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT
12.	<u>Stacking Interface.</u> C.S. Para. 2.4.2, 1.5.5, 1.7.1.7	One pallet shall be stacked on another pallet and stacking features verified. One or more side panels shall removable while CCPs are stacked			Ambient temp.	Forklift.
13.	<u>Tipover Test.</u> C.S. Para. 2.4.6; ASTM D4169, DC-18, A1.2.2.2(1) (D6179 Method F)	The pallet shall be lifted along one long side to a 22° angle from the vertical. The pallet shall be released and allowed to fall freely. Pallet shall right itself and not tip over.			Ambient temp	Quick release, hoist, chains or lifting straps.
<u>Forklift Truck Handling Tests (14 – 16).</u> Tests shall be conducted with stack of 2 CCPs (1 empty stacked on top of loaded CCP and locked in place).						
Additional Pass/Fail Criteria: There shall be no instability of the pallet(s) on the forklift that would create a hazard during normal forklift handling.						
14.	<u>Transportability.</u> C.S. Para. 2.4.7.1; ASTM D4169, DC-18, A1.2.2.2(2) (D6055 Method A)	Transport single CCP with test load over 100 ft. test course through 2 round-trips. Repeat using stack of 2 CCPs (described above).			Ambient temp.	Forklift
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer					APPROVED BY: Robbin L. Miller, Chief AFPTEF	

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR:		WEIGHT (LB) GROSS:		CUBE (CU. FT)	QUANTITY:	DATE:
EXTERIOR: 90 X 46 X 80		TARE: 4000 858.5		200	2	2 Mar 09
ITEM NAME: Prepositioning supplies				MANUFACTURER: Grate Pallet		
CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS		CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT	
15.	<u>Pushing.</u> C.S. Para. 2.4.7.2	Forklift tines shall abut the end of the stack of 2 CCPs near the floor; push for <u>35 ft/85s</u> ; repeat, pushing against long side.		Ambient temp.	Forklift	
16.	<u>Lifted Push.</u> C.S. Para. 2.4.7.2.1	Repeat procedure of Test No. 15, except that one short end shall be lifted off the ground 6 in. by the forklift tine tips.		Ambient temp.	Forklift	
17.	<u>Impact Test.</u> C.S. Para. 2.4.11; ASTM D4169, DC-18, A1.2.2.2(4) (ASTM D880 Proc. A)	Each side and end of fully loaded pallet shall be impacted using an impact velocity of 7.3 ft/s.		Ambient temp.	Impact tester, hoist, forklift.	
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer				APPROVED BY: Robbin L. Miller, Chief AFPTEF		

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR:		WEIGHT (LB) GROSS:		CUBE (CU. FT)	QUANTITY:	DATE:
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CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS		CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT	
18.	<u>Single Hoisting Fittings Strength Test.</u> C.S. Para. 2.4.9; MIL-STD-648, 5.8.5	A fully loaded CCP shall be lifted by each ext. hoisting provision until it clears the ground, and held in place for 5 minutes.		Ambient temp. Lifted upright.	Hoist, chains, weights.	
19.	<u>Vibration Test.</u> C.S. Para. 2.4.12, replaced by: ASTM D4169, DC-18, A1.7 (Random Vibration)	Test method replaced by "real-life" random vibration. One loaded pallet shall be transported by forklift over surface roads and gravel lots for a total of 40 minutes. Operator shall make every effort to drive over surface irregularities (pot holes, cracks, bumps, drains and sloping shoulders). Forklift tines shall be in the "back" position but no other effort will be made to restrict the pallet's movement on the tines.		Ambient temp.	Forklift.	
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer				APPROVED BY: Robbin L. Miller, Chief AFPTEF		

AF PACKAGING TECHNOLOGY AND ENGINEERING FACILITY (Container Test Plan)					AFPTEF PROJECT NUMBER: 09-P-104	
CONTAINER SIZE (L x W x D) (IN) INTERIOR:		WEIGHT (LB) GROSS:		CUBE (CU. FT)	QUANTITY:	DATE:
EXTERIOR: 90 X 46 X 80		TARE: 4000 858.5		200	2	2 Mar 09
ITEM NAME: Prepositioning supplies				MANUFACTURER: Grate Pallet		
CONTAINER NAME: Container Consolidation Pallet (CCP)					CONTAINER COST:	
PACK DESCRIPTION:						
CONDITIONING: None						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS			CONTAINER ORIENTATION & CONDITIONING	INSTRUMENTATION &/or EQUIPMENT
20.	<u>Sling Handling.</u> C.S. Para. 2.4.8; ASTM D4169, DC-18, A1.2.2.2(5) (ASTM D6055 Method F)	Modified for use with a cargo net as follows: Sling shall encircle the sides and bottom of the pallet at points of contact. The angle of slings between the top of the pallet and the lifting hook of the lifting device shall be approximately 45° from the level of the pallet top. The pallet shall be held off the ground for 5 minutes. It may be necessary to raise the pallet higher during the 5 min. if net stretching occurs.			Ambient temp.	Hoist, slings, hooks or rings.
21.	<u>Hoisting Fitting Strength Test.</u> C.S. Para. 2.4.9; MIL-STD-648, 5.8.3	Test method modified to: CCP shall be lifted by all 4 external hoisting provisions, with a test load of 10,000 lb , until free of the floor and allowed to hang for 5 minutes.			Ambient temp. Lifted upright.	Hoist, chains, steel plates.
22.	<u>Superimposed Load.</u> C.S. Para. 2.4.3; ASTM D4169, DC-18, A1.3	Test weight of 8,000 lb shall be placed on one pallet, using another pallet base for a stacking footprint, for 24 hours.			Ambient temp.	Steel plates, iron weights, forklift.
COMMENTS:						
PREPARED BY: Susan J. Evans, Mechanical Engineer					APPROVED BY: Robbin L. Miller, Chief AFPTEF	

APPENDIX 2: Container and Testing Photographs



Figure 1. Grate Pallet CCP.

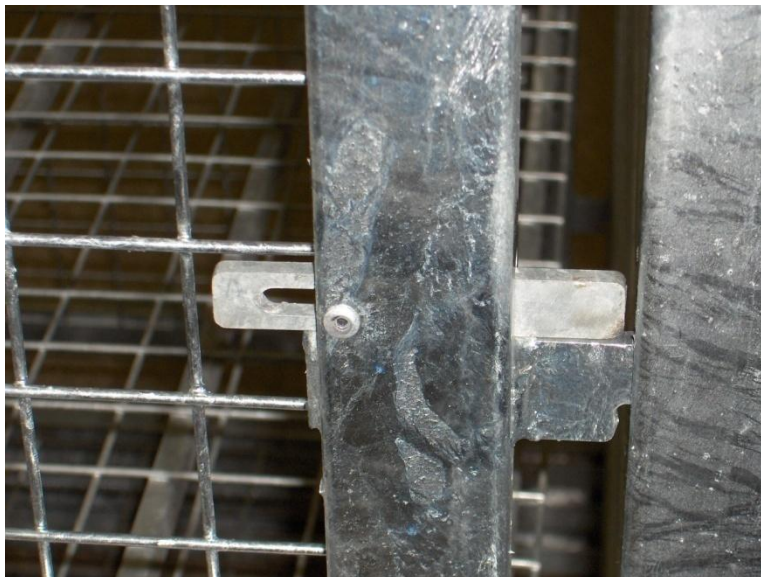


Figure 2. Sliding tab for application of tamper-evident devices.



Figure 3. Center and end panel posts with corresponding shaped openings.



Figure 4. Shelf end panel insert tab with sliding “latch”.

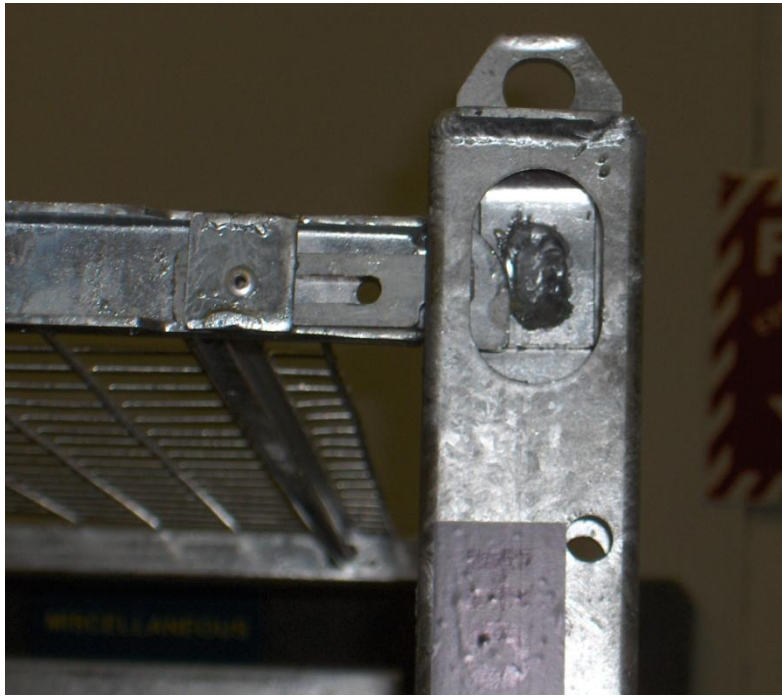


Figure 5. Corner post indexing tab and lockable slide for top panel.



Figure 6. Stacking interface of two collapsed CCPs.



Figure 7. Collapsed stack of 5 VCP pallets (same collapsed (calculated) height as 5 CCPs) in ISO container (at BIC).



Figure 8. Component testing, pallet base.

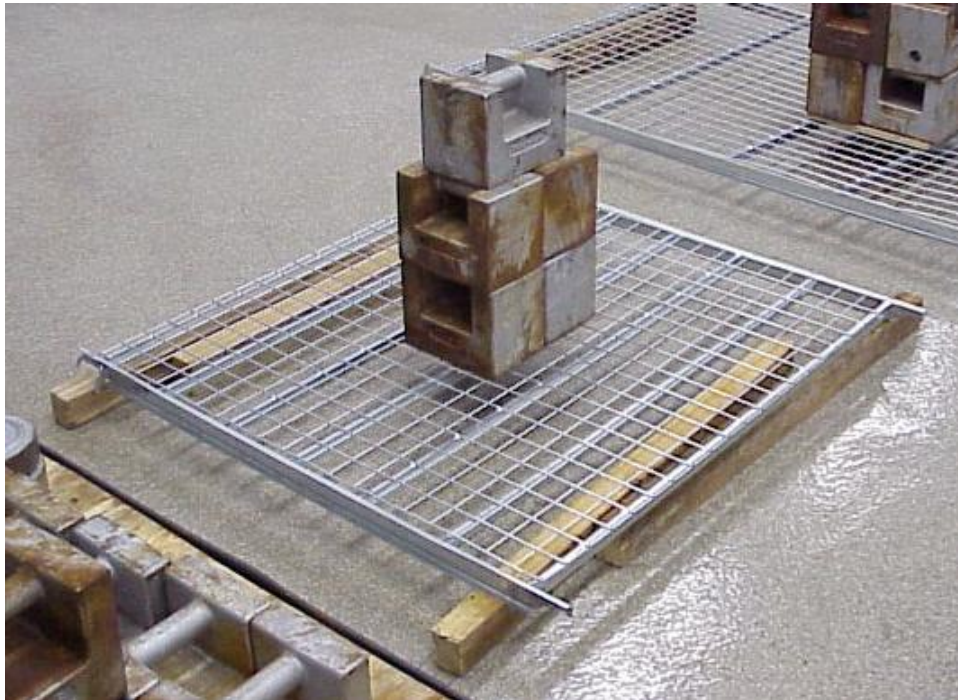


Figure 9. Component testing, shelf.

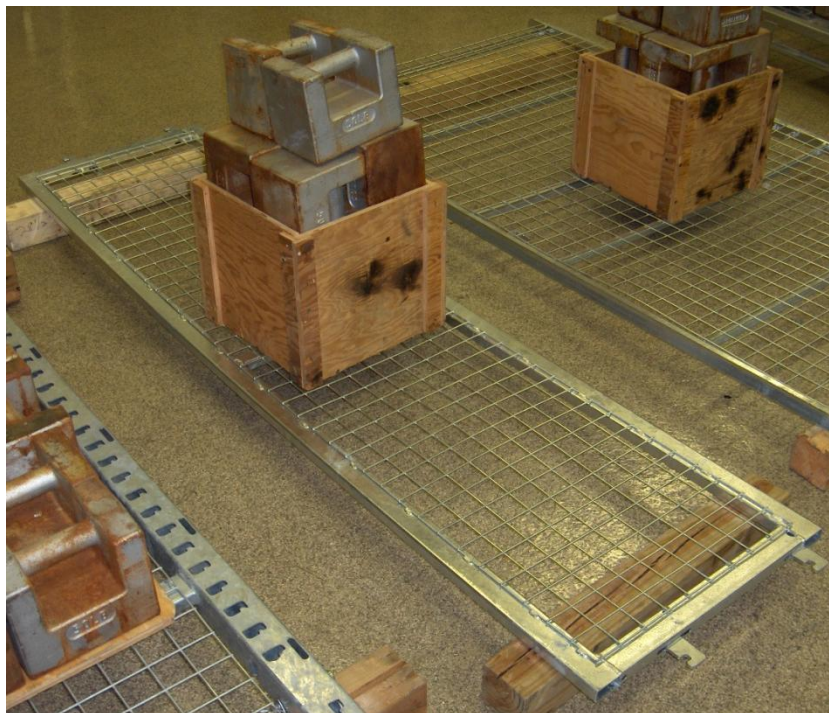


Figure 10. Component testing, side panel.

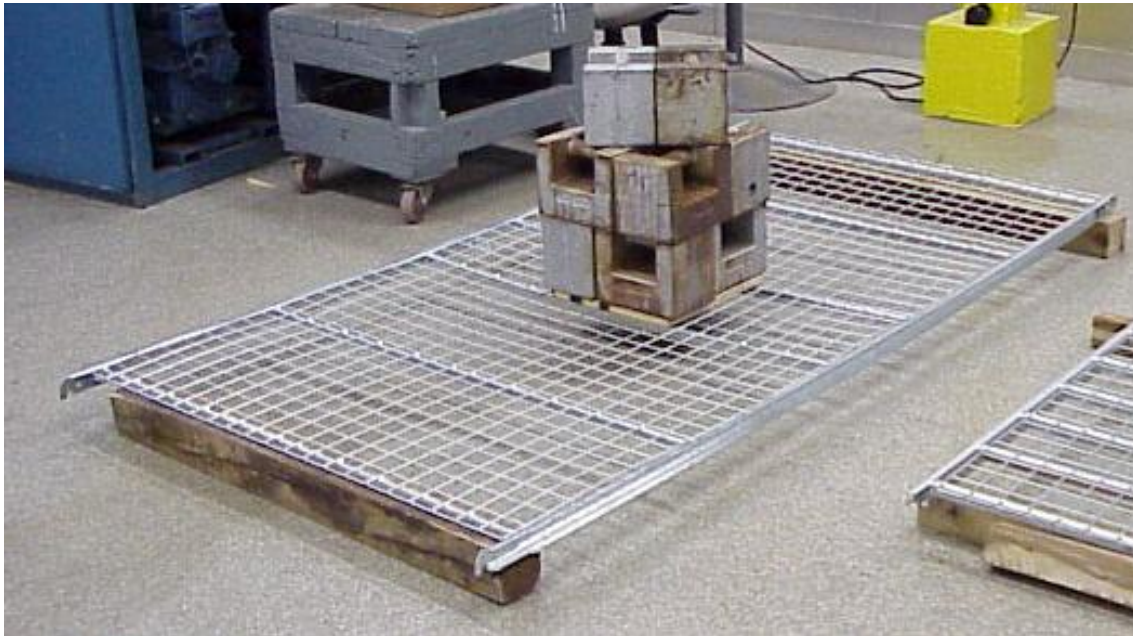


Figure 11. Component testing, top panel.

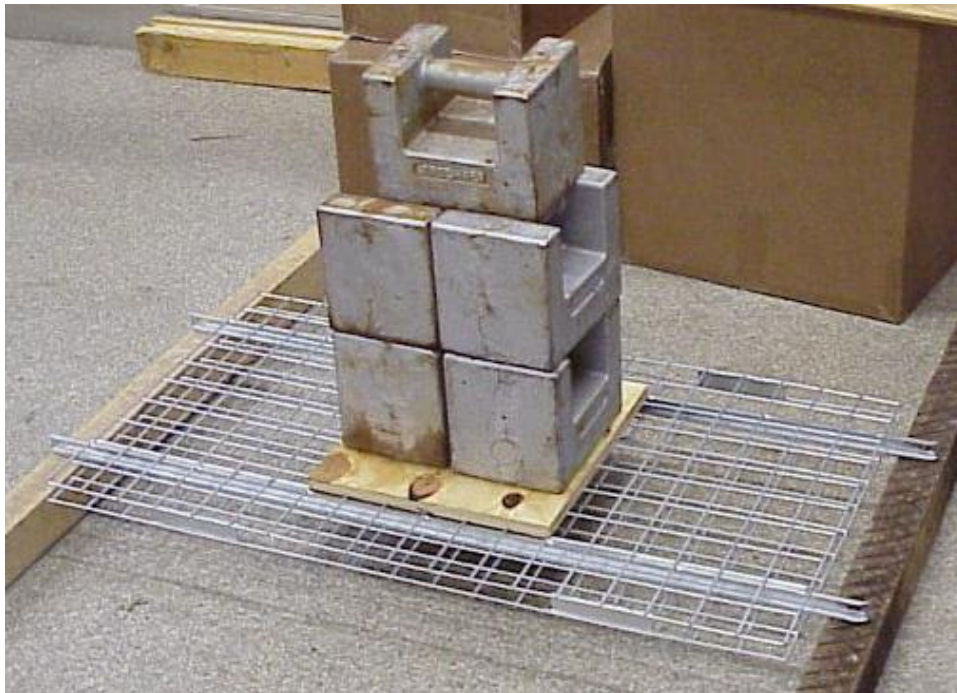


Figure 12. Component testing, center divider.

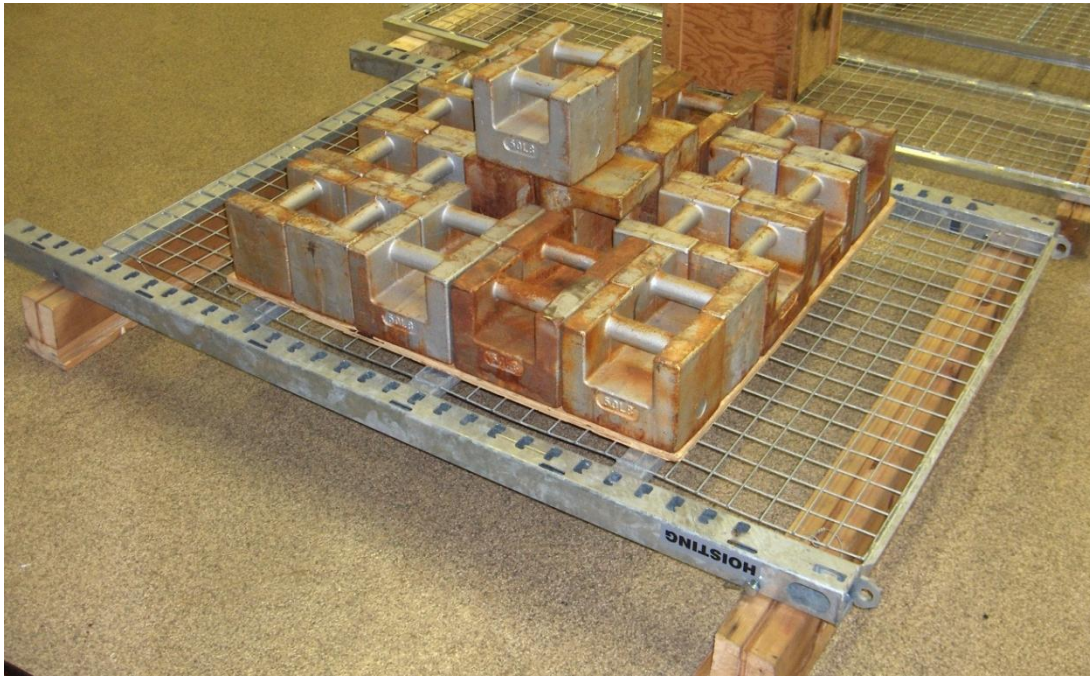


Figure 13. Component testing, end panel.



Figure 14. Placement of test loads.



Figure 15. Cornerwise drop test.



Figure 16. Edgewise drop test (prior to lifting for drop).



Figure 17. Shipboard shock test.



Figure 18. Stacking interface test (forklift handling preparation).



Figure 19. Tipover test.



Figure 20. Forklift truck handling test, transportability, with single CCP.



Figure 21. Forklift truck handling test, transportability, with stacked CCPs.



Figure 22. Forklift truck handling test, pushing.



Figure 23. Forklift truck handling test, lifted push.



Figure 24. Impact test.



Figure 25. Single hoist fittings strength test.



Figure 26. Vibration test method (transport over rough roads).



Figure 27. Sling handling with cargo net.



Figure 28. Hoisting fittings strength test.



Figure 29. Superimposed load test.

APPENDIX 3: Contract Specification

SECTION C - DESCRIPTIONS AND SPECIFICATIONS

The following have been modified:

C-3 DETAILED SPECIFICATION

1.0 Scope This is a performance based specification. Initial and follow-on delivery orders will be based on best value to the Government including cost, quality, and performance.

1.1 Item definition. Each item is a reusable, long-life (100 trips minimum), shipping and storage consolidation pallet (container). They are to be loaded with both pre-packaged and loose materiel. Both types of pallets shall be equipped with four-way forklift entry to permit easy loading and unloading from standard ISO 8 ft x 8 ft x 20 ft shipping containers, loading onto vehicles, and storage or loading in warehouses and cargo holds. Each consolidation pallet shall be easily assembled from the components described below, and shall be capable of providing security for items placed within when locked, while permitting easy visual identification of the items. Pallets shall be designed for easy loading and unloading of materiel. . Pallets shall provide adequate ventilation to prevent entrapment of moisture or interior condensation which could cause degradation of items, packaging or labeling loaded within, especially when fully loaded. Each pallet shall be collapsible to permit a maximum number of each type to be stored, when not in use, in a standard ISO shipping container. The pallet shall be provided in two configurations described below: the Container Consolidation Pallet (CCP) (paragraph 1.7.1) and the Vehicle Consolidation Pallet (VCP) (paragraph 1.7.2).

1.1.1 Service environment. The pallets shall withstand worldwide temperature and humidity ranges, precipitation, and severe conditions from desert to arctic extremes. The pallets are not generally intended to provide environmental protection for the items placed within unless used with a tarp covering.

1.1.2 Transportation and handling modes. Pallets shall withstand handling and transportation by forklift, sling, truck, ship, and rail.

1.1.3 Debris entrapment. All components shall be formed such that debris (dirt, sand, water, insects, leaves, etc.) shall not be trapped inside. The internal areas of any open parts shall be easily inspected for contraband or debris, and easily cleanable by commonly available means (compressed air, hand wiping, hosing with water).

1.2 Material Requirements. Materials shall maintain their structural properties in the above service and storage environments throughout the pallets' lifecycle. No wood shall be used in the fabrication of these pallets. Pallets shall conform to the general requirements of MIL-STD-648, 4.6, 4.6.1, 4.6.2, 4.6.5, and 4.6.6.

1.2.1 Corrosion resistance. Type I and II pallets shall be fabricated from compatible materials inherently corrosion resistant or treated to provide protection against the

various forms of corrosion and deterioration that may be encountered in the expected service and storage environments. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion.

1.2.2 Coatings and surface treatments. Coatings and surface treatments shall be abrasion, chip and scratch resistant. Individual sections of components shall be separately treated to ensure that one part or component shall not tear or pull away the coating from another part or component in use.

1.2.3 Strength of Materials. All fasteners and attachment points shall be of sufficient strength and design to withstand 100 build-ups and tear downs, without breaking, deforming, galling, or otherwise weakening to the point that pallet function is degraded.

1.3 General Design Requirements

1.3.1 Structural members. All structural members (corner posts, reinforcements, shelf supports, etc.) shall be located on the outside of all panels and shelves, and the underside of all shelves, and shall not intrude into the interior pallet space in such a way as to interfere with loading or shifting material. The interior base platform and shelves shall be flat and uninterrupted planes.

1.3.2 Shelves, panels and dividers. The pallet shelves, supports, panels and dividers shall be of sufficient strength and design to support centered loads without permanent deflection or deformation to such a degree that the ability of the fully loaded pallet to withstand stacking, forklifting, shipping, or retention of its contents is degraded (see 1.7.1, 1.7.1.6.2, and 1.7.2). The design of all shelves, panels and dividers shall ensure adequate airflow throughout the pallet to prevent entrapment of moisture or interior condensation. Two shelves, each approximately half the length of the pallet interior, equal one whole shelf level.

1.3.3 Base. The pallet base, when supported only at the base stacking points, shall be capable of supporting a centered load (see 1.7.1 and 1.7.2) without permanent deflection or deformation to such a degree that the ability of the fully loaded pallet to withstand stacking, forklifting, shipping, or retention of its contents is degraded. The pallet base shall be grated, yet sufficiently stiff to permit a minimum clearance of 3 inches between the bottom of a fully loaded pallet and a level floor, along the pallet's entire length, when lifted by a handlift truck in its fully elevated position. . In order to provide adequate support for items with a small footprint, elements of the grating which directly contact and support items placed within shall be no more than 2.5 inches apart in at least one horizontal direction. If the grating of the pallet base does not have sufficient strength to act as tiedown points (i.e., any 2 points shall be capable of restraining a full load), internal tiedowns shall be provided (see 1.3.8).

1.3.4 Interchangeability. All subassemblies and parts, including bases, tops, panels, shelves, supports, and dividers, which can be removed during use, maintenance, or refurbishment, shall be directly and completely interchangeable.

1.3.5 Anti-pilferage provisions. To prevent easy reach or removal of the pallet contents, external gaps between any pallet members, shall be no more than 2.5 inches; and grating/mesh openings, of end, top and side panels, shall be no more than 2.0 inches, nor less than 0.5 inches. Side panels and any other openings that permit access to pallet contents shall be lockable in such a manner as to leave severe visible signs of tampering if opened. Openings in the grating of the pallet base may be larger than 2.5 inches in one horizontal direction only, provided that the design of the pallet base otherwise makes pilferage unlikely when placed directly on the ground or in stacks.

1.3.6 Self-storage of associated parts. Any small parts necessary for the assembly or locking of the pallets shall be tethered to, and provided with storage locations on, the associated pallets or coverings. Neither the locations nor the stored parts shall protrude beyond the outer dimensions of the pallets, nor protrude into the interior storage space in such a manner as to be easily broken, cause damage to materiel in the pallet, or to interfere with placing materiel in the pallet. The stored parts shall stay in place unless deliberately removed.

1.3.7 Storability. When not in use, the pallets shall be collapsible. When in the collapsed condition, the end panels of the pallet shall remain attached to the base frame of the pallet.

1.3.8 Internal Tiedowns. A minimum of four internal tiedown points, for securing a full load, shall be provided on the pallet base. If only four are provided, one shall be located at each of the four corners of the pallet base. Tiedown points may either be integral to the pallet base (e.g., grating openings if the grating is of sufficient strength) or an added feature. The tiedowns shall not interfere with placement of materiel when not in use, and shall not interfere with the forklift tines under the pallet deck nor with the pallet stacking interface. Any two of these tiedown points shall be capable of restraining a full load.

1.4 Ergonomic requirements

1.4.1 Assembly. A complete pallet shall be easily assembled or disassembled by two workers, without the use of tools, in no more than 5 minutes. If pallet components must be assembled in only one relative position, their design, by use of alignment guides or other means, shall permit assembly only in that one relative position. End panels shall lock into the upright position and remain free-standing for assembly.

1.4.2 Component weights. Pallet sides, shelves, and center dividers shall weigh no more than 37 pounds. Top panels shall weigh no more than 74 pounds. CCP end walls shall weigh no more than 88 pounds and VCP end walls shall weigh no more than 44 pounds. The combined component weights of a fully assembled pallet shall meet the requirements of 1.7.1.2 and 1.7.2.2.

1.4.3 Identification and instructional marking requirements. Markings and labeling shall conform to the general requirements of MIL-STD-648, 4.19.2.

1.4.3.1 Barcoding. Each pallet shall bear a barcode in accordance with MIL-STD-130, with additional requirements as specified in the contract.

1.4.3.2 Deleted.

1.4.3.3 Label/Marking plates. Four blank plates for labeling and marking the contents shall be permanently attached to the frame of the pallet as follows:

a. One on each end panel (quantity two), each measuring 8.5 inches plus or minus 1.0 inch (height or width) x 11 inches, plus or minus 1.0 inch (width or height) for both the CCP and VCP.

b. Two on each base, one placed between each of the long-side forklift openings, and each measuring no less than 4 inches (length) x 4 inches (height) (or the maximum practical height permitted by the design considerations of 1.5.3).

1.5 Handling and transportability requirements (general)

1.5.1 Rough handling. The pallets shall be resistant to deformation and damage due to rough handling (drops and collisions) during loading and unloading in ISO containers and various forms of transport.

1.5.2 Hoisting provisions. Hoisting provisions shall not protrude beyond the sides or frame of the pallet, and shall meet the general design and performance requirements of MIL-STD-648, 4.17.3.

1.5.3 Forklift truck compatibility. The pallets shall have provision for four-way forklift entry to permit access and handling by forklift truck. Forklift openings shall be so designed that standard forklift tines shall not damage the load-bearing floor of the pallet. The pallets shall meet the design and performance requirements of MIL-STD-648, 4.17.6, except that fully enclosed tine pockets shall not be used in order to permit the use of handlift trucks.

1.5.4 Handling stability. The pallets, when fully loaded, shall be stable when lifted (unstacked and stacked) and when free standing (not easily toppled), when tested in accordance with 2.3, below.

1.5.5 Stackability. The pallets shall be capable of stacking as described in 1.7.1.7 and 1.7.2.8. Side panels shall be removable from any stacked pallet to allow the contents to be fully accessible and removable; removal shall not affect stack stability. General stacking design features shall conform to MIL-STD-648, 4.16.2.

1.5.5.1 Stacking clearances. There shall be no obstruction on the pallet tops or bases that would interfere with forklift tines when placing a pallet on, or removing it from, a stack.

1.5.6 Vibration. The assembled (loaded or empty) pallet, and individual components and fasteners, shall remain in place and undamaged when exposed to the typical transportation environment vibration.

1.6 Workmanship. Workmanship shall be of sufficiently high quality to assure that the container shall comply with all requirements of this specification. Particular attention shall be paid to bonding, welding, marking and freedom of parts from burrs, chips, cracks, sharp edges, dirt, grease, corrosion, and other foreign matter. The assembled container shall be thoroughly cleaned of all dirt, chips and other foreign matter. Cleaning methods shall not be injurious to any of the parts or assemblies, nor shall the cleaning agent contaminate the parts.

1.6.1 Coatings. Coatings and surface treatments shall be continuous, with no breaks, gaps, bubbles or thin areas.

1.6.2 Welding. Welding shall be in accordance with SAE ARP1967, 3.4.3.

1.7 Pallet Specific Requirements. Requirements shall be verified as described in Section 2 below.

1.7.1 Type I – ISO Container Consolidation Pallet (CCP). Each CCP delivered as a production unit in accordance with CLIN 0002 AA through 0002AC must consist of one base, two end panels, six side panels, one continuous top panel (full length) and four shelves (half-length). The CCP shall be designed with the following features.

1.7.1.1 Dimensions. The CCP shall have maximum outer dimensions of 90 inches long, 46 inches wide, and 80 inches high. A quantity of five CCPs shall fit into a standard 8 ft x 8 ft x 20 ft ISO Shipping Container, with minimal need for blocking and bracing.

1.7.1.2 Weight. The maximum tare weight of a complete CCP shall not exceed 1,000 pounds (with four half or split shelves and three dividers). The maximum gross weight of a fully loaded and complete CCP shall be 4,000 pounds.

1.7.1.3 Pallet Base. The pallet base shall be capable of supporting a centered load of 3,000 pounds without rupturing, pulling away from the base edges, or otherwise deforming in a way, or to such a degree, that the ability of the fully loaded pallet to withstand stacking, forklifting, shipping, or retention of its contents is degraded.

1.7.1.4 End panels. End panels shall be permanently attached to the pallet base, but shall be removable to permit repair or replacement. Each end panel shall allow easy viewing and ventilation of the pallet contents. The end panels shall be made of one continuous wall, i.e., no removable sections or panels. Each end panel shall be capable of supporting a centered load of 1,500 pounds without deformation or damage as described in 1.7.1.3.

1.7.1.5 Side panels. There shall be a total of six side panels, three on each side of the pallet. Each side panel shall be easily attached and removed by one person. Each side

panel shall allow easy viewing and ventilation of the pallet contents. Each side panel shall be capable of supporting a centered load of 500 pounds without deformation or damage as described in 1.7.1.3.

1.7.1.6 Shelves and top panels. Each pallet shall be useable with a minimum of two shelf levels (a total of 4 shelves, each approximately one-half the interior length of the pallet). Each shelf shall be mountable independently of any other shelf (e.g., 2 in one pallet end and none in the other; or all 4 shelves mounted at different heights). Each shelf and top panel shall allow easy viewing and ventilation of the pallet contents. Each shelf shall be capable of supporting a centered load of 250 pounds, and each top panel shall be capable of supporting a centered load of 500 pounds without deformation or damage as described in 1.7.1.3. When mounted in place, there shall be no more than 2.5 inches between the edges of the shelves and the vertical pallet panels.

1.7.1.6.1 Center dividers. Center dividers, similar in design and strength to the side panels, shall be provided to prevent the contents of one shelf from spilling or shifting onto an adjacent shelf. Each pallet shall be useable with a minimum of three center dividers, mountable across the width of the pallet and shelves. Each divider shall be mountable independently of any other divider (e.g., one at the top and one at the bottom; or one in the middle only) or shelf (can be used with no shelves installed). Each divider shall allow ventilation of the pallet contents. When mounted in place, there shall be no more than 2.5 inches between the edges of the dividers and other panels. Each divider shall be capable of supporting a centered load of 250 pounds without deformation or damage as described in 1.7.1.3. Although center dividers are required for all CCP provided during First Article Testing, the actual production quantity shall be addressed separately within the individual delivery order(s). Presently, the Government anticipates approximately 30% of CCPs may require center dividers.

1.7.1.6.2 Shelf attachment points. Attachment points for shelves shall be placed such that shelf height is adjustable within two inches, and all height-corresponding attachment points shall be marked (numbered, lettered, etc) to facilitate level shelf installation. Markings shall be permanent and have sufficient size and contrast to be easily read. Markings shall be located within 0.125 inches of the corresponding attachment points.

1.7.1.7 Stacking. The pallets shall be capable of stacking two high when fully loaded, and capable of being locked together to form one stable unit. The stacked units shall remain stable when empty or fully loaded, and when one or more side panels have been removed.

1.7.1.8 Storability. Five identical stacks, each consisting of five (minimum) collapsed pallets, shall fit into a standard 8 ft. x 8 ft. x 20 ft. ISO container, and require minimal blocking and bracing.

1.7.2 Type II – Vehicle Consolidation Pallet (VCP). Each VCP delivered as a production unit in accordance with CLIN 0003AA through 0003AC must consist of one base, two end panels, two side panels, two top panels (half-length). The VCP shall be

designed for transporting with High-Mobility Multipurpose Wheeled Vehicles, Medium Tactical Vehicle Replacement, trucks, trailers, and Assault Amphibious Vehicle, with the following features.

1.7.2.1 Dimensions. The VCP shall have maximum outer dimensions of 82 inches long, 46 inches wide, and 32.7 inches high. A quantity of ten VCPs shall fit into a standard 8 ft x 8 ft x 20 ft ISO Shipping Container, with minimal need for blocking and bracing.

1.7.2.2 Weight. The maximum tare weight of a complete VCP shall be 360 pounds (with one divider). The maximum gross weight of a fully loaded and complete VCP shall be 2,360 pounds.

1.7.2.3 Pallet Base. The pallet base shall be capable of supporting a centered load of 2,000 pounds without rupturing, pulling away from the base edges, or otherwise deforming in a way, or to such a degree, that the ability of the fully loaded pallet to withstand stacking, forklifting, shipping, or retention of its contents is degraded.

1.7.2.4 End panels. End panels shall be permanently attached to the pallet base, but shall be removable to permit repair or replacement. Each end panel shall allow easy viewing and ventilation of the pallet contents. The end panels shall be made of one continuous wall, i.e., no removable sections or panels. Each end panel shall be capable of supporting a centered load of 750 pounds without deformation or damage as described in 1.7.2.3.

1.7.2.5 Side panels. There shall be a total of two side panels, one on each side of the pallet. Each side panel shall be easily attached and removed by one person. Each side panel shall allow easy viewing and ventilation of the pallet contents. Each side panel shall be capable of supporting a centered load of 500 pounds without deformation or damage as described in 1.7.2.3.

1.7.2.6 Top panels. The pallet must be capable of being loaded from the top. The top must be fully removable, or have a side-hinging capability. Each top panel shall allow easy viewing and ventilation of the pallet contents. Each top panel shall be capable of supporting a centered load of 250 pounds without deformation or damage as described in 1.7.2.3.

1.7.2.7 Center dividers. Center dividers, similar in design and strength to the side panels, shall be provided to prevent the contents in one half of the pallet from spilling or shifting into the other half. Each pallet shall be useable with one center divider, mountable across the width of the pallet. Each divider shall allow ventilation of the pallet contents. When mounted in place, there shall be no more than 2.5 inches between the edges of the dividers and other panels. Each divider shall be capable of supporting a centered load of 250 pounds without deformation or damage as described in 1.7.2.3.

1.7.2.8 Stacking. The pallets shall be capable of stacking four high when fully loaded, and capable of being locked together to form one stable unit. The stacked units shall

remain stable when empty or fully loaded, and when one or more side panels have been removed.

1.7.2.9 Storability. Five identical stacks, each consisting of five (minimum) collapsed pallets, shall fit into a standard 8 ft. x 8 ft. x 20 ft. ISO container, and require minimal blocking and bracing.

1.7.2.10 Tarp covering. A protective tarp covering shall fit both this new design and pallets already in use by the Marines. The tarp material shall be resistant to mildew, water, and ultra-violet radiation. Corrosion resistant fasteners used for securing the tarp covering to the frame shall be secured in such a manner as to prevent access to the interior of the pallet without leaving severe visible signs of tampering; additionally, the tarp material shall be sufficiently reinforced at all fasteners to prevent the fasteners from being easily ripped from the tarp. The covering shall not cover or interfere with, in any way, the stacking openings or the handling provisions (hoisting/tiedown, forklift). The tarp material shall be sufficiently tough and/or reinforced to prevent general fraying and tearing in use.

1.7.2.10.1 Records receptacle. A record receptacle, permanently attached to the tarp covering, shall be provided. The receptacle shall be in accordance with MIL-STD-648, 4.9 or SAE ARP1967, 3.3.5.6.

2. VALIDATION AND QUALITY ASSURANCE PROVISIONS

2.1 First article approval requirements. A minimum of two CCP and four VCP pallets shall be provided and examined for compliance to this specification. For first article testing (CLIN 0001AA), a complete CCP shall consist of one base, two end panels, six side panels, one continuous top panel (full length), four shelves (half-length) and three center dividers. For first article testing (CLIN 0001AB), a complete VCP shall consist of one base, two end panels, two side panels, two top panels (half-length), and one center divider. Approval shall consist of a visual inspection of all above characteristics, measurement of the component parts and complete pallets, weighing of the empty pallets, and testing to ensure compliance. Approval shall include the examination of inspection records, material certifications and the comparison of these documents with the item(s) they describe.

2.1.1 Dimensions. The outermost length, width and height of one pallet of each type, and pallet components, shall be measured for conformance to the requirements of Section 1 as appropriate.

2.1.2 Weight

2.1.2.1 Tare weight. One complete empty pallet of each type, with all related components, shall be weighed and checked for conformance to 1.7.1.2 and 1.7.2.2, as appropriate.

2.1.2.2 Component weight. Individual pallet components (one base and one panel of each type described above) shall be weighed for conformance to 1.4.2.

2.1.3 Assembly. One pallet of each type shall be assembled and disassembled by no more than 2 workers a minimum of 2 times. Difficulty of, and the time needed for, the final assembly and disassembly shall be noted for conformance to 1.4.1 .

2.1.3.1 Interchangeability of components. The components of at least two pallets of each type shall be intermixed at random, and one complete pallet of each type assembled from the intermixed parts. Pallets shall then be disassembled. There shall be no difference in the ease of assembly or fit of components from the procedure performed in 2.1.3.

2.1.3.2 Collapsibility. One collapsed pallet of each type, with all related components included, shall be measured and determined to be in conformance to 1.3.7, 1.7.1.8 and 1.7.2.9.

2.1.4 Loading/unloading. This test shall be conducted by bringing together pallets and a typical appropriate load, and by placing the fully loaded pallets in a standard ISO container. The pallets shall then be removed from the ISO container and unloaded. Care shall be exercised to assure that both the pallets and the loads are representative of the final configuration and that normal dimensional variations are considered.

2.2 Environmental requirements. Pallets shall be capable of meeting all requirements herein regardless of extremes of temperature and humidity in the shipping environment (paragraph 1.1.1). Pallets and/or components made of non-metal materials, whose structural properties change at high and low temperature and humidity, shall be conditioned and tested in accordance with ASTM D 4169, 6.1.2, using the special climatic conditions of 60°C (140°F) and 90% RH. All metal pallets and components shall be conditioned and tested at ambient conditions (as closely to ASTM D 4169, 6.1.1. as possible).

2.3 Component testing. There shall be no permanent deformation or damage of the components that would interfere with their assembly or use with the pallet; permit spillage of, or damage to, articles; or adversely affect safety during transport or storage.

2.3.1 Pallet base. One base of each type shall be supported a minimum of 12 inches off the ground and supported only at each end. The end supports shall not support more than 4 inches of each pallet end. A centered 36 in. x 36 in. load shall be placed on each pallet base for 24 hours. The test load for a CCP base shall weigh 3,000 pounds; the load for a VCP base shall weigh 2,000 pounds.

2.3.2 Shelves, side and top panels. One shelf, one side panel and one top panel of each type shall be supported a minimum of 12 inches off the ground and supported only at each end. The end supports shall not support more than 4 inches of each panel end. A centered 12 in. x 12 in. load shall be placed on each shelf and panel for 24 hours. The

test load for all shelves and half-length top panels shall weigh 250 pounds, and for full length top panels shall weigh 500 pounds.

2.3.3 End panels. One end panel of each type shall be supported a minimum of 12 inches off the ground and supported only at each end. The end supports shall not support more than 4 inches of each panel end. A centered 36 in. x 36 in. load of 1,500 pounds shall be placed on the CCP end; a centered 24 in. x 24 in. load of 750 pounds shall be placed on the VCP end panel. The test period shall be 24 hours.

2.3.4 Center dividers. One divider of each type shall be supported a minimum of 12 inches off the ground and supported only at each end. The end supports shall not support more than 4 inches of each panel end. A centered 12 in. x 12 in. load shall be placed on each divider for 24 hours. The test load shall weigh 250 pounds.

2.4 Handling and transportability requirements. One pallet of each type shall be tested as described below for conformance to 1.5. Each pallet shall be tested fully assembled and loaded unless otherwise noted. Test loads, as described below for each pallet, shall be used. Upon conclusion of any and all testing described below, there shall be no permanent deformation or structural degradation of the pallet, or damage to the contents after the test. There shall be no rupture or deformation of the pallet that would permit spillage of loose articles or packages, prevent installation of side panels and internal shelving or dividers, reduce pallet strength, cause stacking instability, or adversely affect safety during transport or storage. All pallet components shall remain in place. There shall be no damage likely to interfere with forklifting, or pallet fit in an ISO container. The pallets shall meet any additional test criteria described below.

2.4.1 Test load

2.4.1.1 CCP test load. A single 12 in. x 12 in. load of 250 pounds shall be centered on each pallet shelf; a single 36 in. x 36 in. load of 2,000 pounds shall be centered on the pallet floor. Shelf loads shall be blocked/braced in place to minimize shifting during testing. The pallet floor load shall be restrained using no more than 2 of the internal tiedowns. If a load shifts out of place by more than 4 inches during testing, it shall be returned to its original position before testing is continued.

2.4.1.2 VCP test load. A single 36 in. x 36 in. load of 1,500 pounds shall be centered on the pallet floor and restrained using no more than 2 of the internal tiedowns. If a load shifts out of place by more than 4 inches during testing, it shall be returned to its original position before testing is continued.

2.4.2 Stacking interface. A loaded or unloaded pallet shall be stacked on a loaded pallet, and the stacking interface features shall be verified to be in accordance with 1.5.5, 1.7.1.7 and 1.7.2.8, above. The forklift truck handling tests of 2.4.7, using the stacked pallet configuration shall be further verification of the above requirements.

2.4.3 Superimposed load. One pallet of each type, without side panels or internal shelving, shall be tested in accordance with ASTM D 4169, Section 11.3, Schedule B - Warehouse Stacking and Schedule C - Vehicle Stacking, with the following modifications: (1) the required external load for the CCP shall be 8,000 pounds; the required external load for the VCP shall be 19,000 pounds; (2) the test period shall be 24 hour. Prior to testing, pallets shall be conditioned and tested in accordance with 2.2.

2.4.4 Cornerwise and edgewise drops. One pallet of each type shall be tested in accordance with ASTM D 4169, Section 10.3.3(3) Schedule A - DC-18, Mechanical Handling - Rotational Drops, Assurance Level I (ASTM D 6179, Methods A and B) with the following modifications: (1) edge drops shall be performed only on the CCP ends; (2) if pallets consist of non-metal components, perform 2 opposite corner drops, and 2 adjacent edge (one CCP end) drops, under the conditions of 2.2, and condition and perform remaining drops at -40°C (-40°F).

2.4.5 Shipboard shock test (Free-fall drop). One pallet of each type shall be tested in accordance with MIL-STD-648, 5.2.9.1. Components shall be conditioned and tested in accordance with 2.2. For non-metal pallets, condition and repeat test at -40°C (-40°F).

2.4.6 Tipover test (CCP only). One pallet shall be tested in accordance with ASTM D 4169, Section 10.3.3(1) Schedule A - DC-18, Tip/Tipover (ASTM D 6179, Method F). The pallet shall right itself when released from the 22° angle.

2.4.7 Forklift truck handling. One pallet of each type shall be tested as described below. The test shall be repeated using a fully loaded pallet stack (two CCPs; four VCPs).

2.4.7.1 Transportability. One pallet of each type shall be tested in accordance with ASTM D 4169, Section 10.3.3(2) Schedule A - DC-18, Assurance Level I (ASTM D 6055, Method A). There shall be no instability of the pallet on the forklift or signs of permanent deformation or structural degradation.

2.4.7.2 Pushing. One pallet of each type shall be placed on a hard, dry pavement with the forklift tines to abut the end of the pallet near the floor (mast shall be vertical or slightly back-tilt), do not support the pallet with the tines. The pallet shall be pushed a distance of 35 feet in about 85 seconds at a uniform speed. The testing shall be repeated, pushing against the (long) pallet side.

2.4.7.2.1 Lifted push. The pushing test shall be repeated, except that only one short end of each pallet shall be lifted off the ground 6 inches by the tips of the forks.

2.4.8 Sling handling. One fully loaded pallet shall be tested in accordance with ASTM D 4169, Section 10.3.3(5) Schedule A - DC-18, Sling Handling, Assurance Level I (ASTM D 6055, Method F).

2.4.9 Hoisting. External hoisting provisions, of each pallet type, shall be tested in accordance with MIL-STD-648, 5.8.3 (CCP test load 10,000 pounds; VCP test load

15,000 pounds) and 5.8.5. Hoisting provisions shall not fail or permanently deform outside the outer dimensions of the pallet. Components shall be conditioned and tested in accordance with 2.2. For non-metal pallets, condition and repeat test at -40°C (-40°F).

2.4.10 Deleted. .

2.4.11 Impact. One pallet of each type shall be tested in accordance with ASTM D 4169, Section 10.3.3(4), Schedule A - DC-18, Lateral Impacts. Modify method to use ASTM D 880, Procedure A, and an impact velocity of 2.23 m/s (7.3 ft/s) (Assurance Level I).

2.4.12 Vibration. One pallet of each type shall be tested in accordance with ASTM D 4169, Section 13, Schedule F - Loose Load Vibration (ASTM D 999, Method A1). Each pallet shall be tested once loaded and once empty. The pallet, components and fasteners, shall remain fully assembled and all connections and fasteners shall remain fully in place.

APPENDIX 4: Distribution List

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APPENDIX 5: Report Documentation

REPORT DOCUMENTATION PAGE			Form Approved GSA GEN. REG. NO. 27	
<p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any aspect of this collection of information, including suggestions for reducing the burden, to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p> <p>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>				
1. REPORT DATE (DD-MM-YYYY) 28-05-2009		2. REPORT TYPE Technical Final Report		3. DATES COVERED (From - To) February 2009 - May 2009
4. TITLE AND SUBTITLE First Article Testing of the USMC Container Consolidation Pallet (Manufactured by Grate Pallet Solutions)			5a. CONTRACT NUMBER	
			5b. GRANT NUMBER	
			5c. PROGRAM ELEMENT NUMBER	
			5d. PROJECT NUMBER 09-P-104	
6. AUTHOR(S) Susan J. Evans susan.evans@wpafb.af.mil DSN 787 7445 Commercial (937) 257-7445			5e. TASK NUMBER	
			5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Packaging Technology & Engineering Facility 403 SCMS/GUEB 5215 Fairlow St., Ste. 5 Wright-Patterson AFB OH 45433-2540			8. PERFORMING ORGANIZATION REPORT NUMBER 09 R 102	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Marine Corps Depot Island Command Brenda Jameson (Project Manager) 5880 Channel View Boulevard Jacksonville FL 32215-6704			10. SPONSOR/MONITOR'S ACRONYM(S) USMC BICMD	
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for Public Release Distribution Unlimited				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT At USMC BIC's request, AFPTEF developed a performance specification for the USMC prepositioning supplies long-life consolidation containers: the Container Consolidation Pallet (CCP) & the Vehicle Consolidation Pallet (VCP). Requirements were compatibility with pre-existing CCPs and VCPs, and the USMC prepositioning registries system. During 2006, AFPTEF participated in BIC's acquisition efforts. The VCP portion of the contract was awarded to Grate Pallet Solutions, LLC, of Jacksonville, Florida in 2006. The CCP portion was offered for re-award to Grate Pallet, as the back up bidder in 2009. AFPTEF began BIC on 2 CCP's on 2 March 2009. All tests were performed at AFPTEF and BIC. The final Grate Pallet CCP design successfully met all requirements of the performance specification.				
15. SUBJECT TERMS CCP, VCP, USMC, AFPTEF, BIC, Grate Pallet, Pre-positioning, Pallet				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U	LU	
			18. NUMBER OF PAGES 34	
			19a. NAME OF PERSONS RESPONSIBLE FOR Susan J. Evans	
			19b. TELEPHONE NUMBER (include area code) (937) 257-7445	